

## WE CLAIM:

1           1.    A method of heat-treating a workpiece of  
2    hardenable steel, the method comprising the steps of:  
3            partitioning the interior of a furnace into two  
4    longitudinally extending and transversely adjacent zones;  
5            heating one of the zones to a substantially higher  
6    treatment temperature than the other of the zones; and  
7            conveying the workpiece longitudinally through the  
8    furnace with a region of the workpiece moving exclusively through  
9    the one zone and another region of the workpiece moving  
10   exclusively through the other of the zones such that the regions  
11   leave the furnace at different temperatures.

1           2.    The heat-treatment method defined in claim 1  
2    wherein the treatment temperature in one of the zones is above  
3    the  $AC_1$  point for the workpiece and the temperature in the other  
4    of the zones is below the  $AC_1$  point for the workpiece.

1           3.    The heat-treatment method defined in claim 1  
2    wherein the other zone is not heated.

1           4. The heat-treatment method defined in claim 1  
2 wherein the other zone is heated to between the  $AC_1$  and  $AC_3$   
3 points of the workpiece and the one zone is heated to above the  
4  $AC_3$  point of the workpiece.

1           5. The heat-treatment method defined in claim 1  
2 wherein the other zone is heated to slightly below the  $AC_1$  point  
3 of the workpiece and the one zone is heated to slightly above the  
4  $AC_3$  point of the workpiece.

1           6. The heat-treatment method defined in claim 1  
2 wherein the workpiece is unhardened prior to conveyance through  
3 the furnace, the other zone being heated sufficiently to harden  
4 the other region of the workpiece.

1           7. The heat-treatment method defined in claim 1  
2 wherein the workpiece is hardened prior to conveyance through the  
3 furnace, the other zone being heated sufficiently to anneal and  
4 soften the other region of the workpiece.

1           8. The heat-treatment method defined in claim 1,  
2 further comprising the step of  
3           injecting an inert gas into the furnace and thereby  
4 preventing oxidation of the workpiece.

1           9. An apparatus for heat-treating a steel workpiece,  
2 the apparatus comprising:  
3           a longitudinally extending furnace;  
4           partition means subdividing an interior of the furnace  
5 into two longitudinally extending and transversely adjacent  
6 zones;  
7           means for heating one of the zones to a substantially  
8 higher treatment temperature than the other of the zones; and  
9           transport means for conveying the workpiece  
10 longitudinally through the furnace with a region of the workpiece  
11 moving exclusively through the one zone and another region of the  
12 workpiece moving exclusively through the other of the zones such  
13 that the regions are heated to different temperatures.

1           10. The heat-treatment apparatus defined in claim 9  
2 wherein the partition means includes a longitudinally extending  
3 upper partition above the transport means and a longitudinally  
4 extending lower partition below the transport means and  
5 vertically aligned with the upper partition, the upper and lower

6 partitions defining a transversely open gap through which the  
7 transport means extends.

1 11. The heat-treatment apparatus defined in claim 10  
2 wherein at least one of the partitions is displaceable  
3 transversely through a plurality of different transversely offset  
4 positions.

1 12. The heat-treatment apparatus defined in claim 11  
2 wherein there are a plurality of the lower partitions  
3 transversely offset from each other and the upper partition is  
4 displaceable transversely through positions aligned with each of  
5 the lower partitions.

1 13. The heat-treatment apparatus defined in claim 12  
2 wherein the partition means includes  
3 a middle longitudinally extending partition aligned  
4 vertically between the upper and lower partitions, the transport  
5 means displacing the middle partition through the furnace with  
6 the workpiece.